SUPPLEMENTAL SOURCE CONTROL EVALUATION (SSCE) WORKPLAN

Former Bird Facility
6350 NW Front Avenue
Portland, Oregon

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REGISTERED
OREGON
ROBERT W. ZEI
G2076
GEOLOGIST

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Prepared for:
Former Bird Facility
6350 NW Front Ave
Portland, OR

Prepared by:
Forensic Environmental Services, Inc.
113 John Robert Thomas Drive
Exton PA 19341

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INTRODUCTION

This Supplemental Source Control Evaluation (SSCE) Work Plan describes the scope of work for investigative activities to be conducted at the Former Bird facility located at 6350 NW Front Avenue in Portland, Oregon (Figure 1). The SSCE investigation is being conducted in response to March 18, 2015 comments received from the Oregon Department of Environmental Quality (DEQ) on the June 2012 SCE Report prepared by FES, which were further discussed in the June 3, 2015 joint meeting between FES, CertainTeed, and the DEQ, and subsequent discussions.

The objectives of the SSCE are:

1. Delineate the downgradient extent to which site-specific compounds of interest (COIs); i.e., selected metals, total petroleum hydrocarbons (TPH), and polyaromatic hydrocarbons (PAHs), which are present in groundwater above applicable criteria (i.e., Portland harbor screening level values; PH SLVs) near upgradient well MW-22, and evaluate whether these COIs potentially impact Saltzman Creek;

2. Evaluate whether the COIs above applicable criteria in groundwater in the Former Fill Area area of concern (AOC) extend to Saltzman Creek and the Willamette River;

3. Further evaluate surface water and sediment quality within Saltzman Creek upstream and downstream from the Former Bird facility;

4. Evaluate whether COIs above applicable criteria are present in potentially erodible sediments along the banks of Saltzman Creek and the Willamette River; and

5. Evaluate whether site-specific COIs above applicable criteria are present in near-River groundwater (i.e., the hyporheic zone) discharging proximal to Saltzman Creek and the Willamette River.

1.0 SITE DESCRIPTION AND BACKGROUND INFORMATION

1.1 Site Description

The Former Bird facility is located at 6350 NW Front Avenue, Portland, Oregon in Section 18 of Township 1 North, Range 1 East, and Section 13 of Township 1 North, Range 1 West, on tax lots 200-400 plus a portion of lot 500 (see Figure 1). The subject property, currently owned and operated by the CertainTeed Corporation (CertainTeed), occupies approximately 12 acres along the west bank of the Willamette River. A small stream, Saltzman Creek, emerges from a culvert on the western property boundary and flows east to the Willamette River (see Figure 2).

The subject site and surrounding properties are located in Portland's Northwest Industrial District, which is zoned as heavy industrial. Neighboring properties to the Former Bird facility include the Kinder Morgan Energy Partners (KMEP) Terminal of the Willbridge Bulk Fuels Facility (Willbridge Facility) to the west and south, and a former chemical manufacturing facility operated by Arkema, Inc. (Arkema; formerly ATOFINA Chemicals, Inc., ELF Atochem North America, and Pennwalt Chemical Corporation), to the north. Other properties in the general vicinity of the Former Bird facility include additional manufacturing facilities, several pipelines, a municipal waste transfer station, gasoline service stations, and railroad yards. Surrounding properties are depicted on Figure 3.

1.2 Site History

The subject site was undeveloped land prior to being developed by Pacific Roofing Company as a roofing products manufacturing company and felt mill in the late 1930s. Since that time, it has been owned and operated by a series of roofing and/or paper products manufacturers. Prior operators include PABCO products, Fibreboard Paper Products, and Bird & Son, Inc. (Bird). GS Roofing Products Company, Inc. (GS Roofing; formerly known as Genstar) acquired the site from Bird in 1985 and subsequently operated an asphalt roofing material manufacturing facility at the site. Bird and GS Roofing are subsidiaries of CertainTeed.

Current operations at the facility include the manufacturing of roofing products such as asphalt-based shingles and roll goods under Standard Industrial Classification Code 2952. Activities associated with production of roofing products include asphalt storage and heating, materials handling, and finished product storage. Raw materials currently used in the production of roofing products include fiberglass mat, heated asphalt, crushed limestone, sand, and colored granules (and to a lesser degree, copper granules.

1.3 Geological/Hydrogeological Setting

Surficial materials at the Former Bird facility consist of fill, including building debris (e.g., crushed rock, brick, concrete, and wood) and possible dredge spoils, placed in the former fill area, which are underlain by Holocene alluvial channel and overbank deposits. Based on information from an exploratory boring (WGB-5) installed east of well MW-25 (see Figure 2) as part of a pipeline river crossing feasibility study conducted by the City of Portland, the underlying alluvial deposits include 55 feet of poorly graded sands and silty sands, and minor layers (thickness three feet or less) of silts, silty clays, and clays, followed by a 10-foot thick basal layer of silty gravel. Depth to bedrock (Miocene-age Columbia River Basalt) is approximately 90 feet.

Depth to groundwater at the Former Bird facility ranges from approximately 7 feet adjacent to NW Front Avenue to as much as 27 feet in the former fill area where the surface elevation has been raised over the natural grade. Groundwater flow at the Site is east-southeast towards Saltzman Creek and the Willamette River (groundwater discharge points). Generalized groundwater flow maps for the Former Bird facility based on May 2014 & October 2014 gauging data are presented as Figures 4 & 5, respectively.

1.4 Conceptual Site Model

The following potential migration pathways at the Former Bird facility require additional assessment: 1) overland flow (soil and stormwater), which is directed to the stormwater system; 2) permitted stormwater flow to outfalls along Saltzman Creek; 3); infiltration/ exfiltration of groundwater/stormwater in certain segments of the stormwater piping; 4) groundwater transport; and 5) bank erosion. (A sixth pathway, wind blown sediments/soils, is not being investigated as part of the SCE). Additional details are provided below.

Stormwater discharges to Saltzman Creek via permitted outfalls of the storm sewer system. This pathway (and overland flow) is being investigated as part of a Stormwater SCE at the Former Bird facility. The Stormwater SCE is also investigating possible infiltration/exfiltration of groundwater/stormwater via certain segments of the stormwater piping. Stormwater SCE results will be presented in the Comprehensive SCE Report.

Virtually the entire surface of the Former Bird facility is covered by asphalt, concrete, or buildings, reducing the potential for vertical transport/leach of vadose zone contamination (if any) to the water table. (But some leaching may occur due to possible stormwater exfiltration from storm sewers. Also, shallow water was present during drilling in a period of heavy precipitation at boring SB-17, which was installed adjacent to a gravel-covered portion of the Arkema property [see Figure 2], indicating the potential for infiltration in areas adjacent to and upgradient of the Bird property.)

Groundwater moves from the upgradient properties northwest of the Former Bird facility (including Arkema and KMEP) southeast across the Site before discharging to Saltzman Creek and the Willamette River. Groundwater quality in the hyporheic zone associated with Saltzman Creek and the Willamette River was not investigated during the 2012 SCE and has been identified as a potential pathway at the Former Bird facility.

Shallow moist to wet sediment zones were observed (depth approximately 10 to 15 feet) during previous boring installations in the eastern potion of the former fill area (see Figure 2). These moist to wet zones may represent a perched water zone (or stormwater exfiltration) that accumulates above finer-grained fill materials and appears to be water-bearing during initial drilling, but subsequently produces little to no water. The screened zones of MW-13 & MW-14 were installed across this interval during the 2003-04 Preliminary Site Characterization (PSC), and the screened zones of MW-17 & MW-24 were installed across this interval during the 2012 SCE. Wells MW-13 & MW-17 have remained dry, and wells MW-14 & MW-24 produce little water. The interaction of the perched water zone and the water table will be further assessed as part of this Workplan.

Separate-phase product (SPP) was previously present on a sporadic basis in two wells at the Former Bird facility (see Figure 2): MW-11 & MW-12. The previously detected SPP was an extremely viscous, relatively insoluble, asphaltic oil associated with shingle waste and asphaltic materials that were reportedly placed in the former fill area. However, the extent of the SPP appears to be limited to a small area because neither SPP nor shingle waste was detected in the soil borings/monitoring wells installed during the 2012 SCE investigation. Given its physiochemical properties and limited spatial distribution, the potential for SPP transport is extremely limited and there are no indications SPP has migrated to the banks of Saltzman Creek or the Willamette River.

Saltzman Creek receives runoff from a number of upgradient sources. Samples collected in 2012 indicated selected COIs (primarily metals) exceed SLVs in Saltzman Creek surface water and sediments. However, there were insufficient data to more fully assess background conditions, and the impact, if any, from activities at the Former Bird Facility on Saltzman Creek. Therefore, this pathway requires additional assessment.

Riparian slopes at the Former Bird facility are covered in large part by concrete rip-rap and heavy vegetation, which protects the embankments from erosion. There is no evidence of slumping or significant erosion along these riverbanks. However, some COIs were detected at concentrations exceeding SLVs in the 2012 embankment samples: selected metals, one PAH analyte, and DDT (which is suspected to have an off-site source). Therefore, additional assessment of soil quality and mobility is proposed in conjunction with this Workplan.

1.5 Data Gaps

Based on the conceptual site model, the scope of work for this SSCE is intended to address the following data gaps:

- There are insufficient groundwater data to evaluate the significance of COIs in well MW-22 (and their potential impact, if any, to Saltzman Creek);
- There are insufficient groundwater data to evaluate the potential impact, if any, of COIs in the former fill area on Saltzman Creek and the Willamette River;
- There are insufficient upstream and downstream surface water and sediment quality data to evaluate the potential impact, if any, of COIs in the former fill area on Saltzman Creek sediments and surface water; and
- There are insufficient sediment data to evaluate the environmental impact, if any, of potentially erodible sediments in the banks of Saltzman Creek and the Willamette River.

There are also insufficient gauging data to fully evaluate the interaction of stormwater and groundwater (and perched water and the water table). This data gap will be addressed in the Stormwater SCE investigation.

2.0 PROPOSED INVESTIGATIVE ACTIVITIES - TASK 1: MONITORING WELL INSTALLATION

A total of six monitoring wells are proposed in two areas of the Former Bird facility (see Figure 6): 1) three wells will be installed downgradient of monitoring well MW-22, which is located adjacent to NW Front Avenue; and 2) six wells will be installed in the former fill area between the asphalt product storage area and the banks of Saltzman Creek and the Willamette River.

Hydrocarbon-impacted groundwater, which flows towards Saltzman Creek, was detected at well MW-22 during the initial SCE investigation. A total of three soil borings/ monitoring wells are proposed downgradient from MW-22 to document soil and groundwater quality in this area: boring/well MW-26, located approximately halfway between MW-22 and Saltzman Creek, and borings/wells MW-27 & MW-28, located on either side of the underground culvert where Saltzman Creek resurfaces. (Note: Boring/well locations may need to be slightly adjusted in the field to accommodate ongoing plant activities.)

Hydrocarbons and selected metals were detected in groundwater in the former fill area during the initial SCE investigation. Four soil borings/monitoring wells are proposed to investigate soil and groundwater quality closer to the adjacent waterbodies: two borings/ wells will be installed between the finished product storage area and the north bank of Saltzman Creek (MW-29 & MW-30), and one boring/well will be installed between the finished product storage area and the west bank of the Willamette River (MW-31). (Note: Boring/well locations may need to be slightly adjusted in the field to accommodate safe access for the drilling rig.)

The proposed soil borings will be installed via hollow-stem auger drilling methods with ASTM standard-penetration split-spoon sampling at 5-foot intervals to a total depth of approximately 15 to 20 feet for the MW-22 wells and approximately 30 to 40 feet for the former fill area wells. (A perched water zone may be encountered in the former fill area at depths of 15 to 20 feet; however, based on adjacent borings, the groundwater aquifer in this area is expected to be at least 25 feet deep.) Hammer blow counts will be recorded for each six-inch advancement of the split-spoon sampler. Soil cuttings will be containerized in 55-gallon drums pending proper disposal (see Section 6.0).

Recovered split-spoon samplers will immediately be screened with a photoionization detector (PID) to qualitatively select the portion of sample with the highest PID reading for possible laboratory analysis of volatile organic compounds (VOCs). A small portion (approximately 100 grams) of the remaining soil exhibiting the highest PID reading will be placed in a sealable plastic bag, shaken for 15-30 seconds, and allowed to equilibrate to ambient temperature for several minutes before piercing the bag to obtain a PID field screening reading (however, during the previous SCE investigation all field screening readings were at background levels).

At least one soil sample will be collected from each boring for laboratory analysis based on field judgment using the following criteria: 1) presence/absence of staining or odor; 2) elevated field PID reading; and/or 3) degree of water saturation. If criteria #3 is used, soil samples will be collected immediately above the water table. Soil samples will be analyzed for VOCs via EPA Method 8260B, semi-volatile organic compounds (SVOCs) via EPA Method 8270B, PAHs via EPA Method 8270-SIM, total Portland Harbor modified Priority Pollutant List (PH PPL) metals via EPA Method Series 6000/7000, polychlorinated biphenyls (PCBs) via EPA Method 8082, pesticides via EPA Method 8081, herbicides via EPA Method 8151, TPH-gasoline (Gx), diesel (Dx), and heavy oil (HOx) via NWTPH Methods, and total organic carbon (TOC) via EPA Method 9060. Soil samples for VOC and TPH-Gx analysis will be placed into laboratory-supplied bottleware first to reduce potential volatization loss.

Soil samples will be placed on ice and maintained at 4°C in the field pending shipment, under proper chain of custody, to an Oregon-approved laboratory, ESC Lab Sciences (ESC) of Mt. Juliet, Tennessee, (or an alternative Oregon-approved laboratory) for analysis. After the soil samples are prepared, remaining soils will be used to prepare well boring logs by describing the physical characteristics of the soil interval including assessment via Unified Soil Classification System (USCS) for 1) composition; 2) consistency and density; 3) color; 4) moisture content; 5) grain size/sorting; and 6) presence/absence of staining, discoloration, and odors. The above procedure will be continued at each soil boring location for all sampling intervals.

Well construction details will be similar to the monitoring wells installed during previous investigations at the Former Bird facility; i.e., 2-inch diameter schedule 40 PVC with a 10-foot screened interval, appropriate sand pack, bentonite seal, locking well cap, and well vault (and concrete skirt in unpaved areas). Each newly installed well will be developed using a surge and purge method (lowering and raising a submersible pump) until the discharge water is clear and free of suspended sediment. Development water will be containerized in 55-gallon drums for proper disposal (see Section 6.0).

Auger flights and other drilling and well materials will be decontaminated by steam cleaning with potable water between well installations. Wash water will be transferred to 55-gallon drums for later proper disposal (see Section 6.0).

Following a minimum two-week aquifer equilibration period after well development, groundwater samples will be collected (see next section) for analysis of the same parameters as the soil samples (see above). Newly installed monitoring wells will be surveyed to establish horizontal well locations and vertical well top of casing (TOC) elevations.

In addition to the above well installations, two monitoring wells at the Former Bird facility (MW-13 & MW-17), which have consistently gauged dry, will be properly abandoned by the driller. After all well work is complete, the selected Oregon-licensed driller will file the corresponding well installation and abandonment forms with the State of Oregon.

3.0 PROPOSED INVESTIGATIVE ACTIVITIES - TASK 2: LIQUID-LEVEL GAUGING AND MONITORING WELL SAMPLING

Prior to conducting groundwater sampling, all new and existing monitoring wells at the Former Bird facility will be gauged using a liquid-level interface probe capable of detecting SPP. (Note: Wells MW-14 & MW-24, which produce little water and consistently purge dry, are screened in a shallow perched water zone, and will not be sampled during this event.) Following liquid-level data collection, groundwater samples will be collected via the micropurge sampling method. The EPA (1996) has encouraged the use of this method because of its reproducibility, accuracy, and cost-effectiveness.

A micropurging pump capable of flow rates of approximately 0.1 to 0.5 liters per minute will be positioned in the middle of the saturated portion of the screened interval of the well to minimize turbulence in the well bore and hydraulic stress on the formation. Water quality indicator parameters will be monitored during purging with a continuous “flow-through” cell device (YSI-600XL or equivalent). Readings will be taken every three to five minutes until the following stabilization rates are achieved: temperature ± 3%, pH ± 0.1 standard units, oxidation-reduction potential (ORP) ± 10 millivolts (mV), specific conductivity ± 3%, dissolved oxygen (DO) ± 10%, and turbidity ± 10% (or less than 10 Nephelometric Turbidity Units [NTUs]).

After the water quality parameters have stabilized, groundwater samples will be collected directly from the pump effluent line into appropriate laboratory-supplied bottleware. Dedicated tubing and pump bladders will be used at each well, and the sampler will wear a new pair of latex gloves at each groundwater sampling location.

Groundwater samples from newly installed monitoring wells will be analyzed for VOCs (see Section 2.0 for methods), SVOCs, PAHs, total (and dissolved) PH PPL metals, PCBs, pesticides, herbicides, and TPH Gx-Dx-HOx. Analytes at existing monitoring wells will be limited to COIs that previously exceeded PH SLVs at that well.

VOC samples will be collected in a manner that minimizes agitation and the formation of air bubbles, and bottleware will be filled to capacity to eliminate any headspace. All sample containers will be properly labeled, placed in a cooler and chilled to 4°C, and properly entered on a chain of custody form. Field measurements and observations obtained during well purging and sampling will be documented on field sampling forms.

4.0 PROPOSED INVESTIGATIVE ACTIVITIES - TASK 3: SALTZMAN CREEK WATER AND SEDIMENT SAMPLES

To further characterize surface water quality entering, and passing through, the Former Bird facility via Saltzman Creek, surface water samples will be collected from the following locations (see Figure 6): 1) an upstream off-site sample from the western side of Front Avenue[1] (SCO); 2) an on-site access hatch downgradient from well MW-22 (SCH); 3) immediately upstream from on-site stormwater Outfall 001 (SCU); 4) midway between on-site stormwater Outfalls 001 & 002 (SCM); and 5) downstream from stormwater Outfall 002 (SCD). Two sets of surface water samples will be collected at each sampling location: 1) one set within 24 hours of a significant rainfall event (greater than 0.2 inches); and 2) one set at least 72 hours after any significant rainfall events (greater than 0.2 inches) to characterize water quality during periods of high and low runoff, respectively. Surface water samples will be collected directly into laboratory supplied bottleware and analyzed for VOCs, SVOCs, PAHs, total PH metals, PCBs, pesticides, herbicides, and TPH Gx-Dx-HOx (see Task 1 for laboratory methods).

Three (or four) sediment samples will be collected from Saltzman Creek at approximately the same locations as the surface water samples (including the access hatch if sufficient sediment is present on the culvert bottom). Sediment samples will be collected using a small stainless steel (or plastic) spoon or trowel to recover sediment from a depth of approximately one to six inches.

If necessary, samples may be composited from several points in the same general area to obtain sufficient fine-grained material for analysis. The sampling device will be properly decontaminated between sample locations (see Section 6.0).

Collected samples will immediately be transferred to laboratory supplied bottleware. Sediment samples will be submitted for analysis of VOCs, SVOCs, PAHs, PH metals, PCBs, pesticides, herbicides, and TPH Gx-Dx-HOx (see Task 1 for laboratory methods).

[1] This proposed surface water/sediment location is on the KMEP property. KMEP has refused previous sampling access requests from Saint-Gobain Corporation.

5.0 PROPOSED INVESTIGATIVE ACTIVITIES - TASK 4: RIVERBANK SEDIMENT INVESTIGATION

The collection of supplemental embankment soil samples is proposed at multiple locations along the banks of the Willamette River and Saltzman Creek bordering the Former Bird facility (see Figure 6) to augment the samples collected during the 2012 SCE investigation. The riverbank sediment samples will be used to evaluate: 1) the presence/absence of non-metals at concentrations exceeding JSCS SLVs; and 2) possible statistical analysis regarding the previously detected metal SLV exceedances.

During the 2012 SCE sampling event, the DEQ requested that composite samples be collected from the top, middle, and bottom of the embankment. However, the riverbank in these areas is heavily armored with rip-rap, which restricted the collection of soil samples at specific locations, and the presence of dense vegetation prevented access to the middle and upper slope in some areas. Moreover, the analysis of composite sample prevented identification of individual locations with exceedances for follow-up investigation. Therefore, the proposed supplemental sampling will be limited to discrete grab samples.

A maximum of 20 samples will be collected; however, the unmapped physical access restrictions (rip-rap and vegetation) prevent "pre-identification" of specific sampling locations. Because the middle and the bottom of the embankment have the greatest potential to contribute sediment to the river/creek (and also for access and safety considerations), sampling locations will be biased towards the middle and lower portions of the slopes.

Analytes detected during the prior round of sampling included PH metals, PCBs, pesticides, TPH Dx/HOx, and PAHs. Except for one PAH and DDT, exceedances of JSCS SLVs in the 2012 samples were limited to selected PH metals.

Proposed sediment samples will be collected from a depth of approximately six to twelve inches below the surface using a steel (or plastic) spoon or trowel. The sampling device will be properly decontaminated between sample locations (see Section 6.0). Riverbank samples will be analyzed for the parameters detected in the previous riverbank samples: PH metals, PCBs, pesticides, TPH Dx/HOx, and PAHs.

6.0 PROPOSED INVESTIGATIVE ACTIVITIES - TASK 5: PORE WATER INVESTIGATION

Based on recent groundwater sampling data, TPH Dx-HOx and metals, including selected metals at concentrations above SLVs, are present in the former fill area at the Former Bird site. The purpose of this task is to determine the fate and transport characteristics of COIs between the former fill area at the Former Bird site and the area of groundwater discharge in the Willamette River/Saltzman Creek.

Pore water sampling of common field parameters, such as temperature, pH, DO, ORP, and conductivity can often be used to distinguish surface water from underlying groundwater, and locate areas of potential groundwater discharge and the position of the groundwater/surface water interface (GSI). For example, a study along the Columbia River near Hanford, Washington (CH2M Hill, 2011) determined that conductivity was consistently higher in groundwater (vs. river water); however, field values and the degree of difference varied seasonally and with distance to shore. Changes in temperature, especially during the late summer when surface water temperatures are most elevated, may also be a useful marker for the GSI and areas of groundwater discharge.

Depth to water measurements are a relatively easy way to distinguish surface water from underlying groundwater and have been used in numerous studies (see Pitz, 2009, and others). If the depth-specific hydraulic gradient is negative, there is a potential loss of surface water (i.e., surface water predominates in pore water at this depth). If the depth-specific hydraulic head is positive, there is potential groundwater movement towards the surface (i.e., groundwater predominates in pore water at this depth).

The proposed field work consists of a series of transects and samples to collect pore water from below the GSI (i.e., groundwater) along the Willamette River/Saltzman Creek "beach" and where groundwater from the Former Bird site is discharging to the Willamette River/Saltzman Creek. During the initial phase of this task, two "push-point" pore sampler transects will be installed in the study area (see Figure 6). Each transect will consist of three to five points spaced approximately 25 feet apart. (The point spacing in the second transect may be modified based on field data obtained from the first transect.) At least one point along each transect will be installed on the beach/mudflats, one point along each transect will be installed at water's edge, and one point along each transect will be installed in the water (but no more than waist deep).

Field equipment will consist of small-diameter push-point pore water samplers (manufactured by MHE Products), which will be manually inserted into the sediment at each transect location. A screened interval at the base of each sampler will be exposed, and the sampler will be appropriately purged of approximately 150 milliliters (ml), to allow the collection of water samples for measurement of field parameters including temperature, pH, DO, ORP, conductivity, and turbidity.

Hydraulic head will be determined at each location by attaching tubing to the sampling port on the push-point device and creating a “field manometer”. If the water level in the tubing is below the river water level, the pore water is predominantly surface water, and if the water level in the tubing is above the rive water level, the pore water is predominantly groundwater.

Push-point samplers will be installed into the sediment to depths of approximately one, two, three, four, and six feet at each sampling location. (Although a single push-point device can be installed to the maximum depth and then retracted to take samples at shallower depths, the use of multiple devices is more efficient and should help avoid cross-contamination effects and potential fouling of the sampler.) Variations in the field parameters and hydraulic head will be used to identify the depth of the GSI at each transect point.

The depth of the GSI is site-specific and will vary along each transect. Based on a review of recent studies, the GSI often occurs at depths of less than four feet, but GSI depths of eight to ten feet (or more) are possible. If the GSI is too deep to reach manually with the push-point samplers, the study will be terminated at that location. At transect points on the beach located closer to the riverbank, the presence of coarse sediments, such as cobbles, boulders, or other fill material, may prevent full advancement of the samplers.

After the depth of the GSI is located (or field parameters establish the transect point is an area of groundwater discharge), water samples will be collected for laboratory analysis of target COIs (COIs with SLV exceedances in the previously discussed upslope groundwater monitoring wells; see Tasks 1 & 2)[2] plus total organic carbon (TOC) via EPA Method 9060. For comparison purposes, one set of surface water (river) samples will be collected from each transect for laboratory analysis of the same target COIs.

Groundwater samples will be collected from approximately one foot below the GSI (or from a depth that the field parameters have established as an area of groundwater discharge/upwelling) by connecting a peristaltic pump to the push-point sampler. Surface water samples will be collected from approximately one foot above the GSI (or an area of the river removed from any groundwater discharge/upwelling) by connecting a peristaltic pump to the push-point sampler (or submerging a bottom-loading bailer to just above the top of the river bottom sediments). Field parameters including temperature, pH, DO, ORP, conductivity, and turbidity will be monitored before and after groundwater and surface water sampling to ensure there is no leakage (surface water to groundwater, or vice-versa) during sampling.

[2] If pore water sampling takes place before upslope monitoring well data are available, samples will be collected and analyzed for total PH metals, PAHs/phthalates, PCBs, pesticides, herbicides, and TPH Dx-HOx. Samples will not be analyzed for VOCs and SVOCs (except PAHs/phthalates) because these PH COIs have not been detected at concentrations exceeding SLVs in previous SCE groundwater samples collected from the Former Bird site.

After the two transects are completed, additional pore water samples will be collected from a series of points spaced approximately 25 feet apart parallel to the shoreline (see Figure 6). These pore water samples will be collected at the identified target groundwater discharge depth (i.e., additional depth-specific monitoring and sampling will not be conducted at these locations). Field parameters including temperature, pH, DO, ORP, and conductivity, will be monitored before and after sampling to ensure: 1) the pore water samples are associated with areas of groundwater upwelling; 2) there is no leakage from surface water during sampling.

In addition to the water samples, one set of sediment samples will be collected for laboratory analysis from the surface of the river bed in an area adjacent to, but removed from, the groundwater discharge/upwelling zone using a shallow sediment sampler, and one set of sediment samples will be collected in an area that the field parameters have established as an area of groundwater discharge/upwelling (maximum depth two feet or less). Sediment samples will be analyzed for total PH metals, PAHs/phthalates, PCBs, pesticides, herbicides, TPH Dx-HOx, and TOC. Sediment samples will not be analyzed for VOCs and SVOCs (except PAHs/phthalates) because these PH COIs have not been detected in previous SCE sediment samples collected from the Former Bird site.

All equipment for the pore water study will be manually carried down the slope to the investigation area; boat access from the Willamette River will not be required. (A small inflatable raft may be used to hold equipment when working in the water.) No mechanized equipment will be brought onto the beach/mudflats in conjunction with the pore water study. No petroleum fueled generators will be utilized; all water samples will be collected via battery-powered peristaltic pumps (or syringes).

Purge water from each transect point will be discharged to surface water in the immediate vicinity of the sample. After the push-point sampler (and shallow sediment sampler) is extracted, any sediment removed during sampler installation will be returned to the borehole and the surface expression of the borehole will be manually collapsed. Therefore, any disturbance to the beach/mudflats resulting from the proposed pore water study will be limited (e.g., footprints, other shallow depressions) and completely removed by the next high water event.

7.0 DECONTAMINATION AND WASTE DISPOSAL

All non-disposable sampling equipment will be decontaminated as follows:

1) manual scrub with alconox and potable water using a brush;
2) thorough rinse with potable water;
3) triple rinse with distilled water (ASTM Type II); and
4) air dry.

Investigation-derived wastes are anticipated to include monitoring well cuttings, development water, groundwater sampling purge water, and decontamination fluids. These wastes will be containerized in 55-gallon drums, properly labeled, and stored at a secure on-site location until proper disposal. Data from soil and groundwater samples will be used to characterize the waste materials, which are expected to be non-hazardous.

Waste removal and disposal will be subcontracted to WasteXpress of Portland, Oregon (or a similar company). Certificates of proper treatment/disposal/recycling will be provided will the Revised SCE report.

8.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) SAMPLES

Quality assurance/Quality control (QA/QC) field samples will be collected to assess: potential sources of contamination unrelated to the samples, reproducibility of sampling methods, and matrix variability at specific sampling locations. The field QA/QC program will involve the collection of trip blanks, equipment blanks, matrix spike/matrix spike duplicate (MS/MSD) samples, and field duplicate samples.

Trip Blanks

Trip blank (TB) samples will be prepared and supplied by the laboratory, transported and handled in the field in the same manner as other sampling bottleware, and returned to the laboratory for analysis of VOC target parameters. One TB sample will be included with each group of samples (cooler) delivered to the laboratory for VOC analysis (soil/sediment and water/groundwater samples).

Equipment Blanks

Equipment blank (EB) samples will be obtained by pouring demonstrated analyte-free water through or over any non-disposable sampling devices so that the rinsate flows directly into the laboratory supplied sample containers. One set of EB samples will be collected during each sampling activity (i.e., soil, groundwater, surface water, sediments, and pore water) and analyzed for all SSCE parameters (except TOC).

MS/MSD Samples

One set of MS/MSD soil/sediment samples and one set of MS/MSD water/groundwater samples will be collected and analyzed for target VOC parameters. Care will be taken to ensure that each MS/MSD pair can be considered a homogeneous sample split in two; however, there will be no mechanical/physical mixing of samples. The MS/MSD samples will be identified as such and given a sample designation that is consistent with other analytical samples.

Field Duplicate Samples

Field duplicate (FD) samples will be collected to assess the reproducibility of field sampling methods and matrix variability. One FD sample will be collected during each sampling activity (i.e., soil, groundwater, surface water, sediments, and pore water) and analyzed for all SSCE parameters (except PCBs, pesticides, herbicides, and VOCs, which have not been detected in recent samples collected at the Former Bird facility.

Care will be taken to ensure that each FD sample can be considered a homogeneous sample split. FD sample designation will prevent the analyzing laboratory from identifying the corresponding duplicate pair sample.

9.0 SCHEDULE

A tentative schedule for the proposed Supplemental SCE activities is attached as Table 1. Upslope activities (Task 1) will be initiated following DEQ/EPA approval of the SCE Supplemental Workplan (tentative date mid- to late September).

Following the completion of monitoring well installation and development activities, and a minimum two-week aquifer equilibration period, a site-wide semi-annual groundwater sampling event (Task 2) will be scheduled. Saltzman Creek surface water (one event) and sediment samples (Task 3) will be collected at the same time.

Soil and groundwater analytical data should be available approximately two weeks after sampling. If available, the analytical data will be used to select the parameters for the pore water study (Task 5), which will be scheduled shortly thereafter, and must be conducted during low river stage (approximately late July to early October). Analytical data from the pore water study should be available two weeks after samples are submitted to the laboratory.

Riverbank sediment samples (Task 4) may be collected at any time; however, access may be easier when there is less vegetation in the early fall. The second round of Saltzman Creek surface water samples will also be collected at the same time.

Preliminary Supplemental SCE data will be summarized in the form of a technical memo within 60 days of the receipt of all Supplemental SCE final data packages (except Task 4, which may be completed later and the completion of the Stormwater SCE activities currently being conducted under an independent Workplan). After the results are reviewed with DEQ, a comprehensive Revised SCE Report will be prepared for submittal in early 2016.

10.0 REFERENCES

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US EPA, 1994. Requirements for Quality Assurance Project Plans for Environmental Data Operations, August 1994.

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11.0 LIST OF ACRONYMS

List of Abbreviations/Acronyms used in this document

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µs/cm	microsiemens per cm
ABS	skin absorption
AOC	area of concern
Arkema	Arkema, Inc.
ASTM	American Society for Testing and Materials
B	analyte also detected in laboratory blank sample
Bird	Bird & Son, Inc.
°C	degrees Celsius
CD	compact disk
CEG	Certified Engineering Geologist
CertainTeed	CertainTeed Corporation
COC	chain-of-custody form
COI	compound of interest
CON	skin and/or eye contact
DEQ	Oregon Department of Environmental Quality
DDT	dichlorodiphenyltrichloroethane
DI	deionized
DO	dissolved oxygen
DQO	data quality objective
DSL	Oregon Department of State Lands
Dx	diesel
Dupl.	duplicate sample
E	estimated concentration, detected above the LOQ
EB	equipment blank
EDB	1,2-dibromoethane (ethylene dibromide)
EDC	1,2-dichloroethane (ethylene dichloride)
EPA	U.S. Environmental Protection Agency
ESC	ESC Lab Sciences
FB	field blank
FD	field duplicate
FES	Forensic Environmental Services, Inc.
Former Bird	Former Bird Roofing
GS Roofing	GS Roofing Products Company, Inc.
GSI	groundwater/surface water interface
Gx	gasoline

continued

List of Abbreviations/Acronyms used in this document (cont.)

HASP	Health and Safety Plan
HDPE	high density polyethylene
Hg	mercury
HOx	heavy oil
IDLH	immediately dangerous to life and health
ING	ingestion
INH	inhalation
J	estimated concentration, detected below the LOQ
JSCS	Portland Harbor Joint Source Control Strategy
KMEP	Kinder Morgan Energy Partners
L	liter
LOQ	limit of quantitation
MDL	method detection limit
MEK	methyl ethyl ketone (2-butanone)
MIBK	methyl isobutyl ketone (4-methyl-2-pentanone)
mL	milliliter
MRL	method reporting limit
MSDS	Materials Safety Data Sheet
MS/MSD	matrix spike/matrix spike duplicate
mV	millivolts
MW	monitoring well
NA	not analyzed (or not applicable)
ND	non-detect/not detected
NE	not established
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NP	no preservative
NTU	nephelometric turbidity units
NWTPH	Northwest TPH
ORELAP	Oregon Laboratory Accreditation Program
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Act
OV	organic vapor
oz.	ounce
PAH	polyaromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
PCE	tetrachloroethene

continued

List of Abbreviations/Acronyms used in this document (cont.)

PH	Portland Harbor
PID	photoionization detector
ppb	parts per billion
PPE	personal protective equipment
PPL	Priority Pollutant List
ppm	parts per million
ppmv	parts per million by volume
PSC	Preliminary Site Characterization
PVC	polyvinyl chloride
PW	pore water
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RG	Registered Geologist
RPD	relative percent difference
Saint-Gobain	Saint-Gobain Corporation
SAP	Sampling and Analysis Plan
SB	soil boring
SCE	Source Control Evaluation
SIM	selective ion monitoring
SLV	screening level value
SOPs	standard operating procedures
SPP	separate-phase product
SSCE	Supplemental SCE
SVOC	semi-volatile organic compound
SW	surface water
TB	trip blank
TCE	trichloroethene
TMB	trimethylbenzene
TNI	The NELAC Institute
TOC	top of casing
TOC	total organic carbon
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
VOA	volatile organic analysis vial
VOC	volatile organic compound
Western	Western States Drilling
Willbridge Facility	Willbridge Bulk Fuels Facility

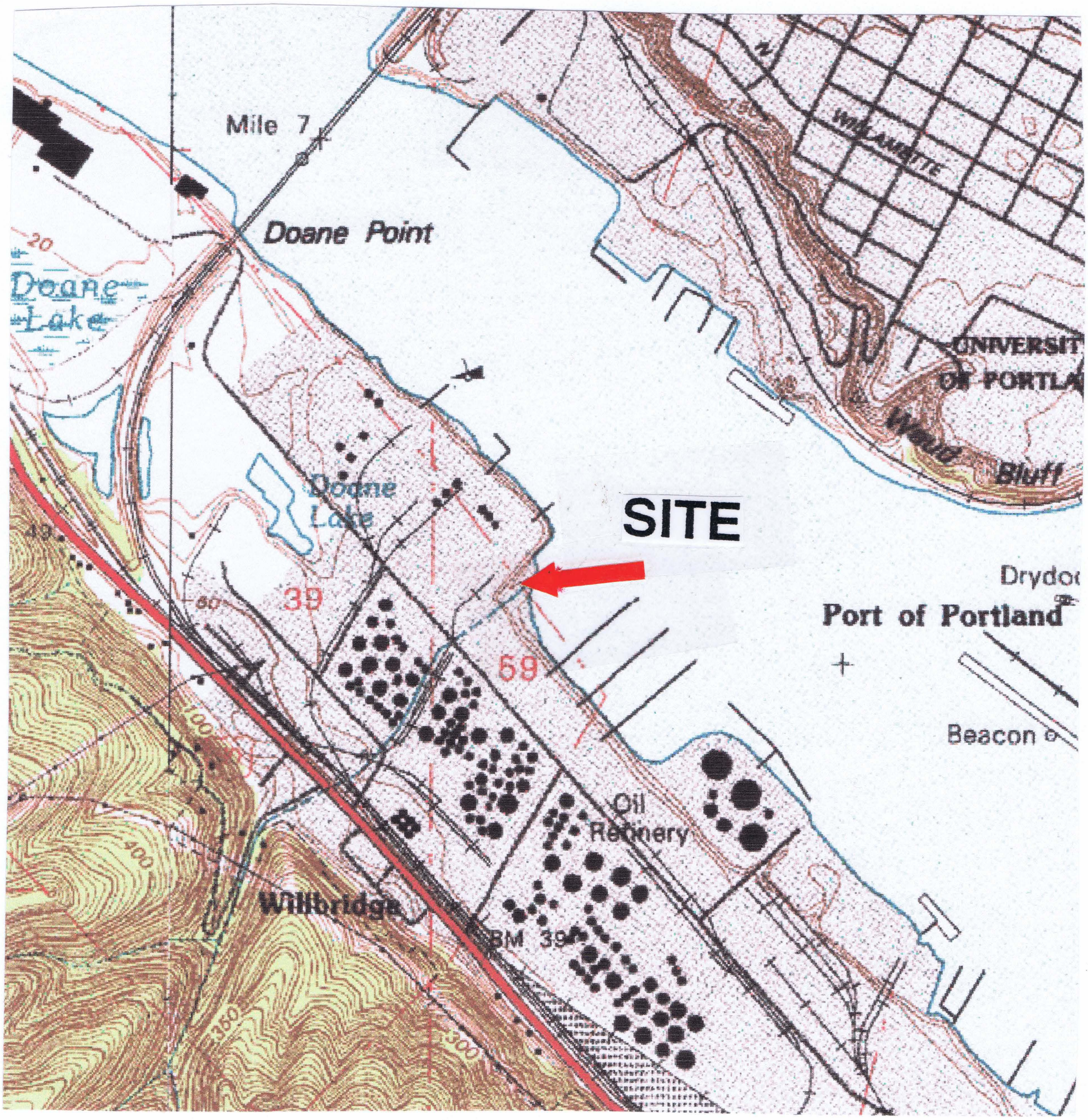
TABLES

Table 1
Future Site Activities Schedule
Former Bird Facility - Portland, Oregon

	1Q2015	2Q2015	3Q2015			4Q2015			1Q
	Mar	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2016
DEQ Comments on SCE Report									
Joint Meeting to Discuss Comments									
Submit Supplemental SCE (SSCE) Workplan									
DEQ/EPA Review of SSCE Workplan									
Prepare for field work/Coordinate subcontractors									
Install New Monitoring Wells - collect soil samples									
Laboratory Analysis/Reporting									
Collect Groundwater Samples									
Laboratory Analysis/Reporting									
Collect First Round of Saltzman Creek Samples									
Laboratory Analysis/Reporting									
Collect Pore Water Study Samples									
Laboratory Analysis/Reporting									
Collect Second Round of Saltzman Creek Samples									
Collect Riverbank Sediment Samples									
Laboratory Analysis/Reporting									
Prepare SSCE Report									

FIGURES

N



FORENSIC ENVIRONMENTAL SERVICES, INC.	FIGURE 1
SITE LOCATION MAP FORMER BIRD FACILITY PORTLAND, OREGON	
0 2000 APPROXIMATE SCALE IN FEET	DRAWN BY: APPROVED BY:

F1.DWG

Forensic Environmental Services, Inc.

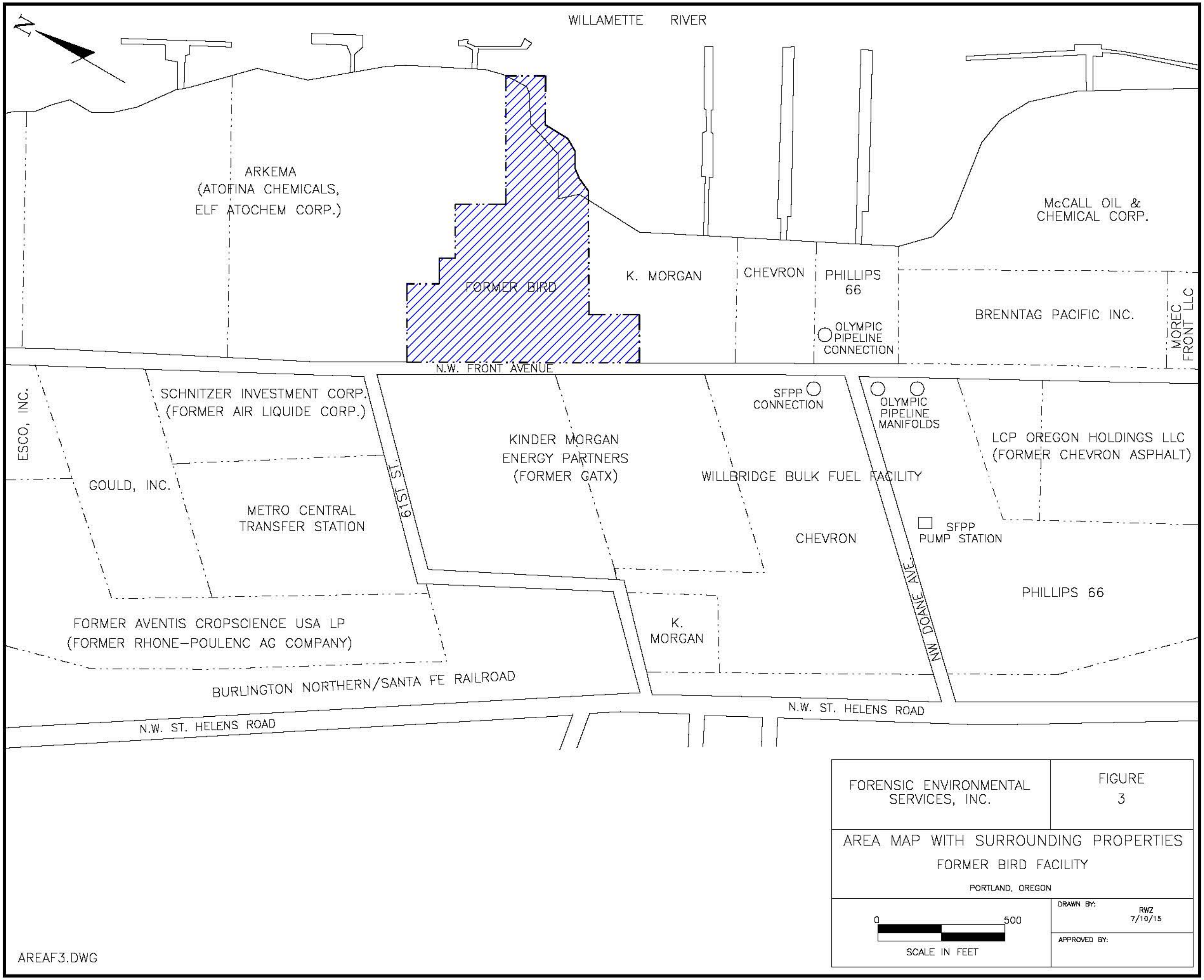
Fig: 2

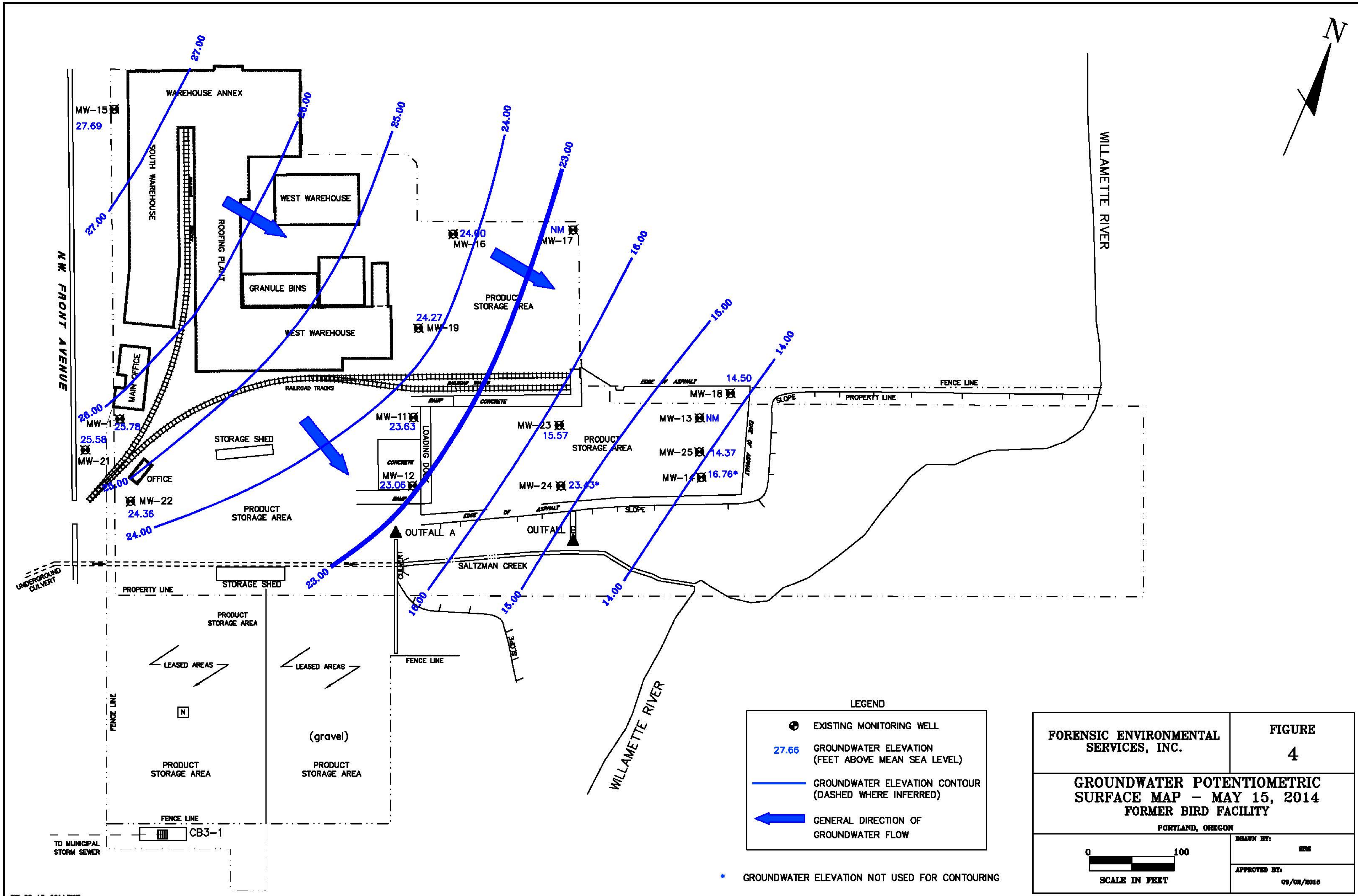
FORMER BIRD FACILITY

PORTLAND, OREGON

Drawn By: SNS
Date: 09/1/2015

Approved By:


N
WILLAMETTE RIVER
ARKEMA
(ATOFINA CHEMICALS,
ELF ATOCHEM CORP.)
FORMER BIRD
K. MORGAN
CHEVRON
PHILLIPS 66
McCALL OIL &
CHEMICAL CORP.
BRENNTAG PACIFIC INC.
MOREC FRONT LLC
OLYMPIC PIPELINE CONNECTION
N.W. FRONT AVENUE
ESCO, INC.
SCHNITZER INVESTMENT CORP.
(FORMER AIR LIQUIDE CORP.)
GOULD, INC.
METRO CENTRAL
TRANSFER STATION
61ST ST.
KINDER MORGAN
ENERGY PARTNERS
(FORMER GATX)
SFPP CONNECTION
WILLBRIDGE BULK FUEL FACILITY
CHEVRON
OLYMPIC PIPELINE MANIFOLDS
LCP OREGON HOLDINGS LLC
(FORMER CHEVRON ASPHALT)
SFPP PUMP STATION
PHILLIPS 66
NW DOANE AVE.
K. MORGAN
FORMER AVENTIS CROPSCIENCE USA LP
(FORMER RHONE-POULENC AG COMPANY)
BURLINGTON NORTHERN/SANTA FE RAILROAD
N.W. ST. HELENS ROAD
N.W. ST. HELENS ROAD
FORENSIC ENVIRONMENTAL
SERVICES, INC.
FIGURE
3
AREA MAP WITH SURROUNDING PROPERTIES
FORMER BIRD FACILITY
PORTLAND, OREGON
DRAWN BY:
RWZ
7/10/15
0
500
SCALE IN FEET
APPROVED BY:
AREAF3.DWG



FORENSIC ENVIRONMENTAL SERVICES, INC.

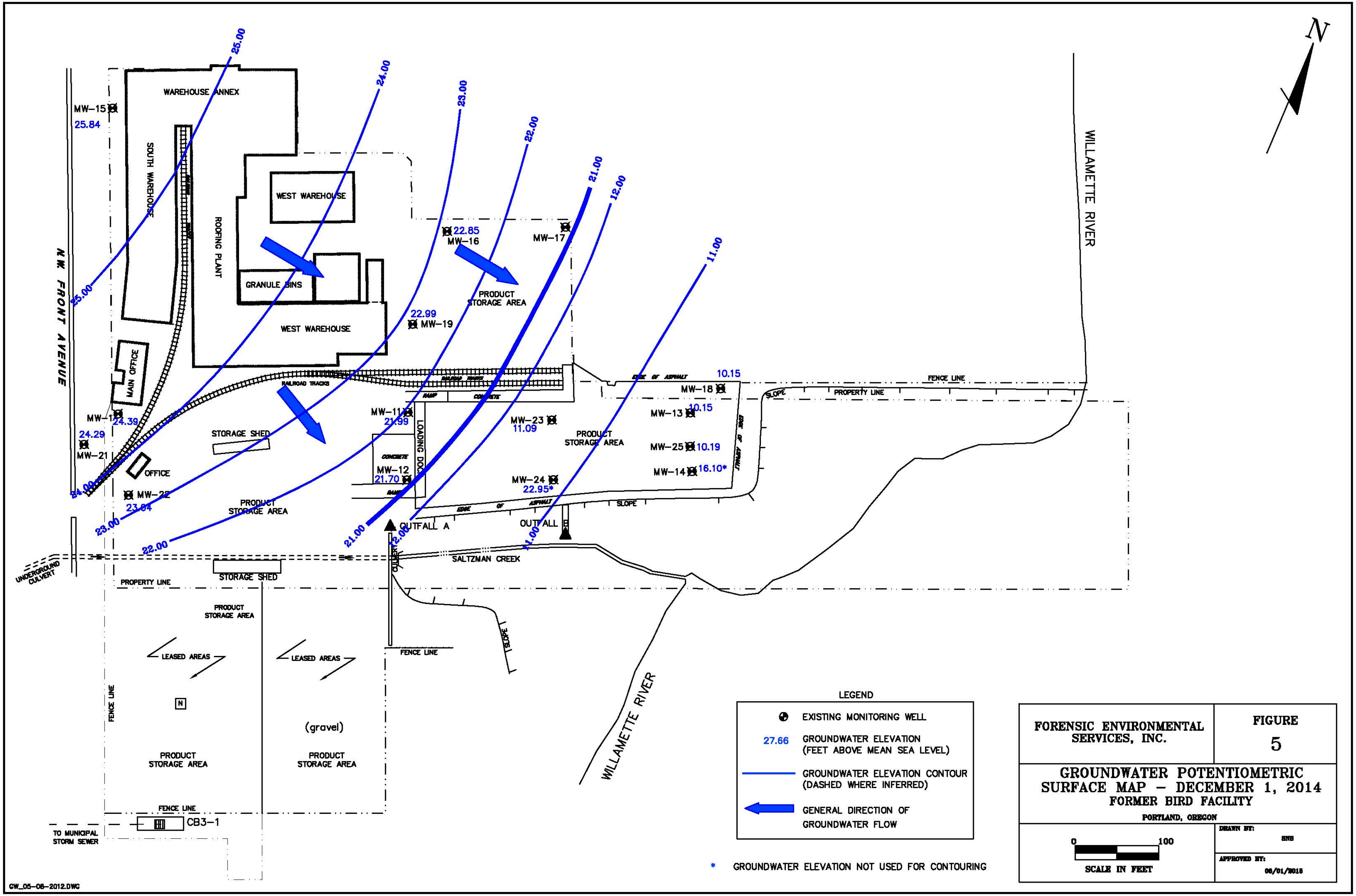
FIGURE 4

GROUNDWATER POTENTIOMETRIC SURFACE MAP – MAY 15, 2014
FORMER BIRD FACILITY
PORTLAND, OREGON

DRAWN BY: HNS

APPROVED BY: 09/02/2016

GW_05-15-2014.DWG



N
WAREHOUSE ANNEX
SOUTH WAREHOUSE
WEST WAREHOUSE
ROOFING PLANT
GRANULE BINS
WEST WAREHOUSE
MAIN OFFICE
OFFICE
STORAGE SHED
RAILROAD TRACKS
PRODUCT STORAGE AREA
LOADING DOCK
CONCRETE
RAMP
EDGE OF ASPHALT
SLOPE
FENCE LINE
PROPERTY LINE
N.W. FRONT AVENUE
WILLAMETTE RIVER
SALTZMAN CREEK
OUTFALL A
OUTFALL B
UNDERGROUND CULVERT
CULVERT
LEASED AREAS
(gravel)
CB3-1
TO MUNICIPAL STORM SEWER
25.00
24.00
23.00
22.00
21.00
12.00
11.00
MW-15 25.84
MW-16 22.85
MW-17
MW-19 22.99
MW-11 21.99
MW-12 21.70
MW-1 24.39
MW-21 24.29
MW-22 23.04
MW-23 11.09
MW-24 22.95*
MW-18 10.15
MW-13 10.15
MW-25 10.19
MW-14 16.10*
LEGEND
EXISTING MONITORING WELL
27.66 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
GENERAL DIRECTION OF GROUNDWATER FLOW
* GROUNDWATER ELEVATION NOT USED FOR CONTOURING
0 100
SCALE IN FEET
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 5
GROUNDWATER POTENTIOMETRIC SURFACE MAP – DECEMBER 1, 2014
FORMER BIRD FACILITY
PORTLAND, OREGON
DRAWN BY: SNB
APPROVED BY: 06/01/2015
GW_05-08-2012.DWG

Forensic Environmental Services, Inc.

Fig: 6

PROPOSED SSCE ACTIVITIES

FORMER BIRD FACILITY
PORTLAND, OREGON

Drawn By: SNS
Date: 08/26/2015
Approved By:

APPENDIX A

QUALITY ASSURANCE PERFORMANCE PLAN (QAPP)

APPENDIX B

SAMPLING AND ANALYSIS PLAN (SAP)

APPENDIX C

HEALTH & SAFETY PLAN (HASP)